DALHOUSIE UNIVERSITY

Faculty of Science Course Syllabus

Department of Earth and Environmental Sciences

ERTH 3140 Structural Geology

Winter Term 2026

Course Instructor:	*Djordje Grujic*	*dgrujic@dal.ca*	LSC E&E 3045
TA:	*Michael Powell*	*michael.powell@dal.ca*	
Lectures:	Mo, We, Fr	Fri 13:35-14:25 pm	LSC-C2016
Laboratories:	We	14:35-17:25 pm	LSC-E&E B2030
Office time:	*by request*		

Course Description

The course on Structural Geology is crafted to encompass three comprehensive levels of analysis: Descriptive, Kinematic, and Dynamic, each aligning with fundamental strategies in modern structural analysis.

1. ***Descriptive Analysis**: This level emphasises geometric principles to meticulously identify, describe, and interpret prevalent structures observed in both outcrop and hand samples, focusing on their orientation. It delves into the factual aspects of physical properties, orientation, and internal configuration of structures. The descriptive approach is multidimensional, incorporating direct field observations, laboratory experiments on rock deformation, subsurface drilling, geophysical monitoring, and detailed studies of rock stratigraphy and petrography.*
2. ***Kinematic Analysis**: Here, the spotlight is on deciphering the deformational movements that give rise to various structures. This analysis primarily revolves around evaluating the distortional and dilational changes in a body, with a keen focus on strain analysis.*
3. ***Dynamic Analysis**: This segment interprets deformational movements through the lens of the forces and stresses instrumental in structure formation. It aims to elucidate both the relative magnitudes and the precise orientation of these stresses. Dynamic analysis is meaningful only when it successfully explicates the plan of kinematic movement and the physical and geometric characteristics of the structures.*

Furthermore, the course provides an in-depth understanding of the mechanical properties of rocks by analysing their microstructure and texture. It also interprets the crustal rheological structure using the aforementioned principles.

Lab Exercises: The practical component of the course involves students in various lab exercises. These exercises enable students to perform standard and specialised measurements essential for gathering Earth Sciences data. Students will learn to articulate their findings through visual representations, master basic construction and plotting techniques to evaluate stress and strain in deformed rocks, and synthesise large datasets of structural measurements to deduce primary geological features.

Course Prerequisites

ERTH 2002, ERTH 2110 Field Methods, ERTH 3000. Mathematics and Physics highly recommended

Related Courses: ERTH 4350 (Tectonics) requires this course.

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Course Objectives/Learning Outcomes

- Use geometrical principles to identify, describe, and interpret common types of structures in outcrop and hand samples. Interpret the mechanical properties of rocks based on their microstructure and texture.
- Apply basic construction and plotting techniques to calculate and interpret stress and strain in deformed rocks. Generalise large sets of structural measurements and observations and infer first-order features.
- Apply modern techniques to assess structures (from hand sample to regional scale), discuss their geohazard, and write a technical report on the results.
- Associate different categories of structures to the geological settings of their formation. Examine the relation of structures to the localisation of resources or geohazard.

Required Course Materials

- *Textbook: Structural Geology (Haakon Fossen, Cambridge University Press, 2016)*
- *Labs: tracing paper, graph paper, pencils, ruler, Laptop with MS Office.*
- *Course website: BrightSpace*

Course Assessment

Component	**Weight (% of final grade)**	**Date**
Mid-Term Exam	*32 %*	***March 23**, multiple choice*
Final exam	*33%*	*In Person, review questions*
Labs	*35%*	*Each to be submitted within one week*

Conversion of numerical grades to Final Letter Grades follows the <u>Dalhousie Common Grade Scale</u>

A+ (90-100)	**B+** (77-79)	**C+** (65-69)	**D**	(50-54)
A (85-89)	**B** (73-76)	**C** (60-64)	**F**	(<50)
A- (80-84)	**B-** (70-72)	**C-** (55-59)		

Course Policies

All labs to be done: Late submission or no submission is an F

Missed exams: F, No alternative dates

Failed exams: No catch-up exams

Weather-related cancelled classes: according to the Dalhousie Announcements

- Dalhousie email is the University's primary communication tool.

Technical Requirements

- Laptop or tablet
- Software: Microsoft Office, Adobe Acrobat and several free geological programs.

Technology Support

If you require support for the course or university technologies (Brightspace, email, Microsoft applications), you can contact Information Technology Services (ITS) at support@dal.ca

Course Structure

Our course is organised into 13 weekly modules:

1	*January 7*	*Introduction to the Structural Geology*
2	*January 12*	*Force and Stress*
3	*January 19*	*Faults*
4	*January 26*	*Joints*
5	*February 2*	*Fault Regimes*
6	*February 9*	*Mohr Diagram*
7	*February 23*	*Mechanics of Faulting*
8	*March 2*	*Rheology and Strain*
9	*March 9*	*Folds and Fold Mechanisms*
10	*March 16*	*Foliation and Fold-Cleavage*
11	*March 23*	*Lineation and Boudinage*
12	*March 30*	*Shear Zones*
13	*April 6*	*Deformation Mechanisms*

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Faculty of Science

Student Resources and Support

University Policies and Programs

Important Dates in the Academic Year (including add/drop dates): http://www.dal.ca/academics/important_dates.html
Classroom Recording Protocol: https://www.dal.ca/dept/university_secretariat/policies/academic/classroom-recording-protocol.html
Dalhousie Grading Practices Policies: https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html
Grade Appeal Process: https://www.dal.ca/campus_life/academic-support/grades-and-student-records/appealing-a-grade.html
Sexualized Violence Policy: https://www.dal.ca/dept/university_secretariat/policies/health-and-safety/sexualized-violence-policy.html
Scent-Free Program: https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html

Learning and Support Resources

General Academic Support – Advising (Halifax): https://www.dal.ca/campus_life/academic-support/advising.html
General Academic Support – Advising (Truro): https://www.dal.ca/about-dal/agricultural-campus/ssc/academic-support/advising.html
Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness.html
On Track (helps you transition into university, and supports you through your first year at Dalhousie and beyond): https://www.dal.ca/campus_life/academic-support/On-track.html
Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html
Indigenous Connection: https://www.dal.ca/about-dal/indigenous-connection.html
Elders-in-Residence (The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit the office in the Indigenous Student Centre or contact the program at elders@dal.ca or 902-494-6803: https://cdn.dal.ca/content/dam/dalhousie/pdf/academics/UG/indigenous-studies/Elder-Protocol-July2018.pdf
Black Student Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html
International Centre: https://www.dal.ca/campus_life/international-centre.html
LGBTQ2SIA+ Collaborative: https://www.dal.ca/dept/vpei/edia/education/community-specific-spaces/LGBTQ2SIA-collaborative.html
Dalhousie Libraries: http://libraries.dal.ca/
Copyright Office: https://libraries.dal.ca/services/copyright-office.html
Dalhousie Student Advocacy Services: https://www.dsu.ca/dsas?rq=student%20advocacy
Dalhousie Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html
Human Rights and Equity Services: https://www.dal.ca/dept/hres.html
Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html
Study Skills/Tutoring: http://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

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Faculty of Science Advising Support: https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html

Safety

Biosafety: http://www.dal.ca/dept/safety/programs-services/biosafety.html
Chemical Safety: https://www.dal.ca/dept/safety/programs-services/chemical-safety.html
Radiation Safety: http://www.dal.ca/dept/safety/programs-services/radiation-safety.html
Laser Safety: https://www.dal.ca/dept/safety/programs-services/radiation-safety/laser-safety.html

The following campus services are available to help students develop skills in library research, scientific writing, and effective study habits. The services are available to all Dalhousie students and, unless noted otherwise, are free.

Service	Support Provided	Location	Contact
General Academic Advising	Help with - understanding degree requirements and academic regulations - choosing your major - achieving your educational or career goals - dealing with academic or other difficulties	**Killam Library Ground floor** Rm G28 ***Bissett Centre for Academic Success***	In person: Killam Library Rm G28 By appointment: - e-mail: advising@dal.ca - Phone: (902) 494-3077 - Book online through MyDal
Dalhousie Libraries	Help to find books and articles for assignments Help with citing sources in the text of your paper and preparation of bibliography	**Killam Library Ground floor** Librarian offices	In person: Service Point (Ground floor) By appointment: Identify your subject librarian (URL below) and contact by email or phone to arrange a time: http://dal.beta.libguides.com/sb.php?subject_id=34328
Studying for Success (SFS)	Help to develop essential study skills through small group workshops or one-on-one coaching sessions Match to a tutor for help in course-specific content (for a reasonable fee)	**Killam Library 3rd floor** Coordinator Rm 3104 Study Coaches Rm 3103	To make an appointment: - Visit main office (Killam Library main floor, Rm G28) - Call (902) 494-3077 - email Coordinator at: sfs@dal.ca or - Simply drop in to see us during posted office hours **All information can be found on our website: www.dal.ca/sfs**
Writing Centre	Meet with coach/tutor to discuss writing assignments (e.g., lab report, research paper, thesis, poster) - Learn to integrate source material into your own work appropriately - Learn about disciplinary writing from a peer or staff member in your field	**Killam Library Ground floor** Learning Commons & Rm G25	To make an appointment: - Visit the Centre (Rm G25) and book an appointment - Call (902) 494-1963 - email writingcentre@dal.ca - Book online through MyDal We are open six days a week **See our website: writingcentre.dal.ca**

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